

# Claims

1. (Amended) A transmitter apparatus for transmitting an information symbol sequence from a first radio station having an array antenna having  $M$  ( $M > 1$ ) elements to a second radio station, the transmitter apparatus comprising:

vector control means for producing a plurality of  $N$  ( $N$  is a positive integer) dimensional vectors; and

vector multiplexing means for producing vector-multiplexed symbol sequences in the number of  $N$  multiplexed by multiplying the plurality of  $N$  dimensional vectors on a plurality of symbol sequences containing the information symbol sequence and transmitting same through the array antenna having  $M$  elements;

whereby the vector control means produces the plurality of  $N$  dimensional vectors set such that, at the second radio station, at least one symbol sequence containing the information symbol sequence is to be received of among the plurality of symbol sequences whereas other symbol sequences are to be canceled.

2. (Added) A transmitter apparatus according to claim 1, wherein the vector control means produces the plurality of  $N$  dimensional vectors depending upon a propagation parameter featuring a propagation channel of between the first radio station and the second radio station.

3. (Amended) A transmitter apparatus according to claim 2, further comprising propagation channel analyzing means for producing a propagation channel matrix as the propagation parameter,

wherein said vector control means produces a plurality of  $N$  dimensional vectors obtained by singular-value

decomposition of the propagation channel matrix.

4. (Amended) A transmitter apparatus according to claim 2, further comprising propagation channel analyzing means for producing a propagation channel matrix as the propagation parameter,

wherein said vector control means produces a plurality of N dimensional vectors obtained by eigen-value decomposition of a correlation matrix of the propagation channel matrix.

5. (Amended) A transmitter apparatus according to claim 2, further comprising reference symbol producing means for producing a reference symbol known also to the second radio station and

propagation channel information receiving means for receiving information about propagation parameter transmitted from the second radio station and determining the propagation parameter,

wherein the information about propagation parameter is produced from the propagation parameter which the second radio station determined from the reference symbol transmitted from the first radio station.

6. (Amended) A transmitter apparatus according to claim 1, wherein the plurality of symbol sequences, in part or all, are symbol-mapped based on modulation schemes different one from another.

7. (Amended) A transmitter apparatus according to claim 1, wherein the plurality of symbol sequences, in part or all, are spread by code sequences different one from another.

8. (Amended) A radio communication method for transmitting an information symbol sequence from a first radio station having an array antenna having M elements to a second

radio station, the radio communication method comprising:

an N dimensional vector producing step for the first radio station to generate a plurality of N dimensional vectors set such that, at the second radio station, at least one symbol sequence containing the information symbol sequence is to be received of among the plurality of symbol sequences containing the information symbol sequence while other information symbol sequences are to be canceled;

a step of multiplying the plurality of N (N is a positive integer) dimensional vectors on the plurality of symbol sequences containing the information symbol sequence and producing vector-multiplexed symbol sequences multiplexed and in the number of N; and

a step of transmitting the vector-multiplexed symbol sequences from the first radio station to the second radio station through the array antenna having M elements.

9. (Added) A radio communication method according to claim 8, having a step of transmitting a reference signal made up by a reference symbol known to the first radio station, from the second radio station to the first radio station having an array antenna having M elements,

wherein, in the N dimensional vector producing step, the first radio station calculates a propagation parameter featuring a propagation channel of between the second radio station and the first radio station from the reference symbols in the number of M received, and produces the plurality of N dimensional vectors by using same.

10. (Amended) A radio communication method of transmitting an information symbol sequence from a first radio station having an array antenna having M elements to a second

radio station, the radio communication method comprising:

a step of transmitting, from the first station to the second station, a reference signal containing reference symbols known to the second radio station;

a step for the second radio station to produce a channel information symbol sequence containing a propagation parameter featuring a propagation channel of between the second radio station and the first radio station, from the reference signal received;

a step of transmitting the channel information symbol sequence from the second radio station to the first radio station;

a step for the first radio station to produce a plurality of  $N$  ( $N$  is a positive integer) dimensional vectors set such that, at the second radio station, at least one symbol sequence containing the information symbol sequence is to be received of among a plurality of symbol sequences containing an information symbol sequence while other information symbol sequences are to be cancelled, by use of the propagation parameter extracted from the channel information symbol sequences received;

a step of multiplying the plurality of  $N$  dimensional vectors on the plurality of symbol sequences containing the information symbol sequence and producing vector-multiplexed symbol sequences multiplexed and in the number of  $N$ ; and

a step of transmitting the vector-multiplexed symbol sequences at the array antenna having  $M$  elements, from the first radio station to the second radio station.